MORPHOLOGY OF RHEUMATIC BLOOD.

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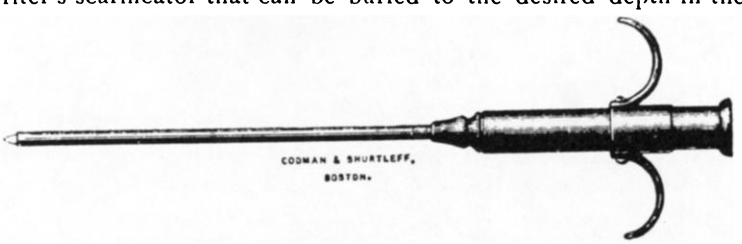
[ABSTRACT.]

1. *Collection.* Specimens must be removed from blood-stream as quickly as possible. The patient should be present and the blood should be examined directly, with no loss of time. This is particularly insisted on, as there is a general impression abroad that blood can be collected by any one and kept almost any time before examination. From this mistake has come misapprehension.

2. *Kind of blood collected. Capillary: not venous, not arterial.*

3. *Site of collection.* The forearm above the wrist. The end of the finger is a favorite site for collecting blood with some observers, but the fat and dirt found there are objections, to say nothing of the unnecessary pain of punctures. If dirty, the forearm should be washed with soap and water, or ammonia and water, and rubbed dry with a clean towel previously to puncture.

4. *Instrument for collecting the blood.* Fig. 1 is a cut of the writer's scarificator that can be buried to the desired depth in the



skin with a single, sudden, painless motion. It is desirable to obtain no more or no less blood than is sufficient to fill the space between an ordinary cover-glass and slide. This amount is a drop about one-eighth of an inch in diameter. By thus preserving a uniformity

in the size of the drop of blood as near as possible, one can form an approximate judgment of the comparative number of corpuscles in different specimens of blood. It is well to clean the point of the instrument after use, by driving it into a clean towel.

5. *How to get the blood of patient.* Having the forearm of patient and the instrument ready, the observer grasps the wrist with the left hand in such a way that the skin is tense. The scarificator is applied to radial or ulnar surface, whichever is held uppermost, avoiding veins and hairs, and the point is entered by approximating the thumb and fingers of the right hand holding the instrument. The point then pierces the skin so quickly as hardly to be felt, and the cut fills with blood. Usually it is necessary to squeeze the part in order to make the drop exude. A clean scalpel is then used to scrape off the blood, and to transfer it to the slide, when it is immediately covered and transferred to the stage of the microscope.

6. *Power employed.* One-quarter inch or $\frac{1}{10}$-inch objective. Two-inch or 1-inch eye-piece. The writer uses Tolles' or Green's objectives.

7. *What to look for.* (1.) *Red corpuscles; color, form, arrangement, plasticity, adhesiveness.* In rheumatism they are generally sticky and adhesive, outlines not rigid, huddling together in ridges or irregular masses. They appear as if their covering of neurine was removed and hence they travel with friction through the blood-vessels, and adhere to each other.

(2.) *White blood corpuscles.* They are apt to be more numerous, enlarged and filled with granules which may or may not be salts in granular form.

(3.) *Serum.* After the blood has stood a short time on the slide the serum will become filled with:

A. *Fibrin filaments in network.* The smaller the meshes, the stronger the threads. These same fibrin filaments are also present in consumptive blood, and are due to a complication of rheumatism.

B. *Fibrin filaments in larger threads, ribbons and skeins.* These are very marked at times in size and length. They form oftentimes skeins of considerable size. When long and narrow they will run through two or more fields of the microscope. Often they are of such transparency as to be almost overlooked, like the sheath of

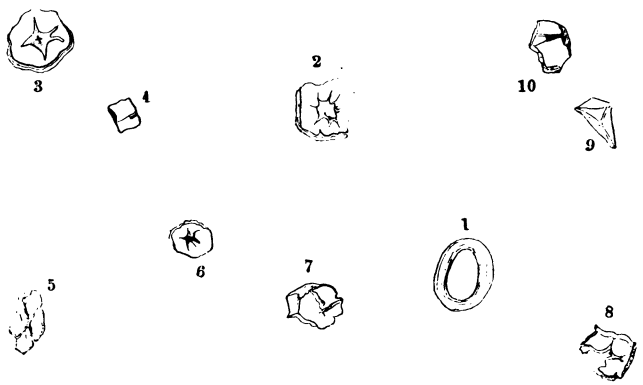
a floscularian. But usually the red corpuscles crowd around them so that when a ridge is seen of unusual length, twists and curves, a curl of fibrin filaments is usually found to be the basis of the configuration. Sometimes the skeins are inextricably coiled and curled up, at other times they are free like a lock of combed hair. Sometimes the skeins are very numerous, in which case embolism is to be feared, and sometimes they are few and isolated. Unevenness and transparent snowy whiteness are usually enough to diagnosticate them from mycelial filaments found in the blood, which belong to the vegetable kingdom.

C. *Fibrin filaments in thrombi that become emboli.* These are found simple or embracing within their substance red and white corpuscles and crystaline bodies either entire or broken, one or all. They are very large, comparatively, at times, and are probably formed for mechanical accumulations on the periphery of other fibrin filaments, or from elements encountered in the blood, just as a snowball grows by rolling in the snow. The presence of such bodies in the blood-stream sufficiently explains the formation of fibrinous concretions on the valves of the heart, or amongst its columnæ carneæ. Sometimes they are very large. For example, in the heart of the late Dr. B. Cutter, the father of the writer, two fibrinous concretions were found, each measuring eight inches in length. One originated among the columnæ carneæ of the left ventricle, and extended into the aorta. The other originated among the columnæ carneæ of the right ventricle and extended into the pulmonary artery. It is easy to understand local swelling about joints and other parts of the body, when such thrombi or clots become emboli or plugs in the adjacent blood-vessels. When such are found in the blood of a patient, there is need of immediate treatment, for sudden and otherwise mysterious deaths have been traced back to embolism.

This is not a paper on treatment, but it may be in order to here intimate that ammonia baths and one pint of hot water flavored with aromatic spirits of ammonia, drank one hour before each meal and on retiring to bed, with medicines addressed to putting the liver, skin, kidneys and other emunctories in good condition, and regulation in the diet, will soon remove such thrombi, and no cure is thorough

unless the microscope shows that the blood is restored to its normal morphology. Such is the positive value of the microscope in the treatment of rheumatism.

.D. *Crystaline bodies.* These are generally: 1, crystine; 2, oxalate of lime; 3, phosphates; 4, uric acid; 5, hippuric acid, etc. In normal states these bodies are formed in the human body by the cells of the glands, when imperfect feeding or some other cause has deranged the functions of digestion, assimilation and organization. If the salts are formed in too great a quantity to be kept in solution by the eliminated fluids, they accumulate in the fluids and tissues. Uric acid is more soluble than oxalate of lime or cystine, hence it



Cystine found in the blood of a case of sciatica.

1. Form where the center has dropped out. 2. Crystal with worn edges and central depression; color faint blue. 3. Another, pale yellow. 4. Fragment intensely blue. 5. Crystal with stellate fracture. 6. Hexagon, pale blue. 7. Crystal partly cracked. 8, 9 10, fragments.

is natural that the latter are oftenest found. The phosphates of lime, soda and magnesia accumulate likewise. The physical presence of these salts in the blood fluids and tissues of the body, seems to be a sufficient cause of the pathological states we call rheumatism; and the proof of this idea lies in the fact that when these crystals are removed with the other conditions named, a cure is effected. It is true that persons may have the morphology of rheumatic blood and yet have no pains, no swellings, no troubles that they can detect until they are upset by a cold or some other exciting cause. It will then be more accurate to refer the morphology of rheumatic blood

to the domain of predisposing causes, it being comparable to the ammunition in a gun-barrel, the cold or other exciting cause being like to the pulling of the trigger. The explosion may be called rheumatism. If the gun is not loaded, or if the trigger is not pulled, there is no explosion. So if the predisposing and the exciting causes are not present, we cannot have rheumatism. Once the morphology of rheumatic blood was found in a lady apparently in perfect health. She was surprised at the diagnosis, but coming later in contact with an exciting cause, she wrote, "You were right about my rheumatism."

See *American Journal Medical Sciences*, October, 1867, Philadelphia, Pa., for paper which this corroborates.